

Antiangiogenic activity of sophorolipids extracted from refined bleached deodorized palm olein

Shazmin Kithur Mohamed¹, Muhammad Asif¹, Mansoureh Vishkaei Nazari¹, Hussein M Baharetha¹, Syed Mahmood², Abdul Rashid M. Yatim³, Aman Shah Abdul Majid⁴, Amin Malik Shah Abdul Majid⁵

¹ Department of Pharmacology, EMAN Testing and Research Laboratory, School of Pharmaceutical Sciences, Universiti Sains Malaysia, Minden, Penang, Malaysia

² Department of Pharmaceutical Engineering, Faculty of Engineering Technology, University Malaysia Pahang, Gambang, Malaysia

³ Advanced Oleochemicals Technology Research Division, Malaysian Palm Oil Board, Kajang, Selangor, Malaysia

⁴ Faculty of Medicine, Quest International University Perak, Ipoh, Perak, Malaysia

⁵ Department of Pharmacology, EMAN Testing and Research Laboratory, School of Pharmaceutical Sciences, Universiti Sains Malaysia, Minden, Penang, Malaysia; ACRF Department of Cancer Biology and Therapeutics, The John Curtin School of Medical Research, Australian National University, Canberra, Australia

ABSTRACT

OBJECTIVES: Sophorolipids (SLs) are a group of surface-active glycolipids produced by a type of nonpathogenic yeast *Candida bombicola* in the presence of vegetable oil through fermentation technology. SLs have shown antitumor activity; however, the mechanism of action underlying the anticancer activity of SLs is poorly understood. This work evaluated the anticancer activity of SLs fermented from palm oil by exploring its antiangiogenic activity. **MATERIALS AND METHODS:** The SLs that were fermented and further characterized for their biochemical activities. Cytotoxicity study was performed to assess cytostatic properties. A series of *in vitro* and *ex vivo* angiogenesis assay was also carried out. The relative fold change in the expression of p53 mRNA by SLs was also studied. **RESULTS:** Altogether, the data show that SLs derived from palm oil fermentation process inhibited neovascularization in the *ex vivo* tissue segments and also the endothelial cell proliferation between 50% and 65% inhibition as a whole. The palm oil derived SLs also caused downregulation of the suppression level of vascular endothelial growth factor and also upregulate the p53 mRNA level. The analytical studies revealed the presence of high amount of phenolic compounds but with relatively weak antioxidant activity. The gas chromatography-mass spectrometry studies revealed abundant amount of palmitic and oleic acid, the latter an established antiangiogenic agent, and the former being proangiogenic. **CONCLUSION:** Therefore, it can be concluded from this study that SLs derived from fermented palm oil have potent antiangiogenic activity which may be attributed by its oleic acid component.

KEYWORDS

Antiangiogenic; Anticancer; Fermentation; Palm oil; Sophorolipids

ACKNOWLEDGEMENT

The authors would like to express their gratitude to the Malaysian Palm Oil Board, Universiti Sains Malaysia, EMAN Biodiscoveries Sdn. Bhd. and Natureceuticals Sdn. Bhd. companies for providing research facilities. We also gratefully acknowledge the financial support from the Ministry of Agriculture (MoA), Malaysia, under NKEA Research Grant Scheme; grant number: 304/PFARMASI/650735/K123 and 304/PFARMASI/650737/K123.